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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 0204

Application Number: 09/917,096
Filing Date: July 27, 2001
Appellant(s): MAZUMDER ET AL.

John G. Posa
For Appellant

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EXAMINER'S ANSWER

This is in response to the appeal brief filed December 17, 2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The rejections of claims 1, 4, 5, 7, 8, 14, and 17 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

The rejections of claims 2 and 15 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

The rejections of claims 3 and 16 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

The rejections of claims 6 and 18 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

The rejections of claims 9, 11, 12, 13, 19, and 20 independently stand or fall.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,837,960	Lewis et al.	11-1998
6,046,246	Jeantette et al.	4-2000
5,952,057	Parks	9-1999
5,875,830	Singer et al.	3-1999

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-9, 11, and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis et al. (US 5,837,960) in view of Jeantette et al. (US 6,046,426).

Lewis teaches a direct metal deposition controlled by a computer-aided design program (abstract; column 15, lines 35-68). The powder is chosen to impart different properties to the article being coated, including wear resistance, phase difference, density, hardness, and conductivity and may vary by location (column 24, line 29 - column 25, line 68). As the article is being melted and solidified as it is being formed, this reads on being a non-equilibrium synthesis. The article is a tool or a die (column 4, lines 8-10). Powder is fed into the melt pool that the laser creates (column 5, lines 60-68). A description of the to-be-fabricated article is provided to the CAD equipment (column 15, lines 35-45). The reference fails to teach the optical monitoring for feedback control.

However, Jeanette teaches that optical monitoring for feedback control is used in order to prevent variations in layer thickness when depositing powder into a melt pool that a laser creates (column 8, lines 28-60). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize optical monitoring for feedback control in the process taught by Lewis. By doing so, one would reap the benefits of preventing variations in layer thickness.

Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis et al. (US 5,837,960) in view of Jeantette et al. (US 6,046,426), as applied to claim 7, and further in view of Parks (US 5,952,057).

Lewis, in view of Jeanette, teaches the limitations of claim 1. Additionally, Lewis teaches that the powder used is dependant on the desired property that is to be incorporated into the article and is not limited by the process, but fails to teach selecting a powder such that corrosion and oxidation resistance is increased. However, Parks teaches that it is well known to impart corrosion and oxidation resistance to an article by laser deposition and teaches the appropriate powders for achieving such (column 2, lines 21-44). Therefore, to would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize the powders taught by Parks in the process taught by Lewis in view of Jeanette. By doing so, one would reap the benefits of increased corrosion and oxidation resistance.

Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis et al. (US 5,837,960) in view of Jeantette et al. (US 6,046,426), as applied to claim 7, and further in view of Singer et al. (US 5,875,930).

Lewis, in view of Jeanette, teaches the limitations of claim 7, but fails to teach the use of cooling channels and thermal boundaries in the to-be-fabricated tool. However, Singer teaches that cooling channels and thermal barriers are used in tools such that the temperature can be easily controlled when the tool is in use (column 2, lines 1-30).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize cooling channels and thermal boundaries in the tool taught by Lewis in order to easily control the temperature when the tool is in use.

(11) Response to Argument

With respect to claim 1, the applicant argues that Jeantette "does not teach the limitations of optically monitoring the physical dimension and automatically controlling the physical dimension in accordance with the description of an article to be fabricated." The examiner disagrees.

In response, the examiner points out that Jeantette explicitly teaches providing a description of the article to a computer that automatically controls the physical dimension in accordance with this description (column 9, lines 43-67). Jeantette also teaches a laser triangulation device used to verify layer thickness in-situ (column 8, line 28 - column 9, line 5). The devices allows for real-time, position-sensing data to be used to correct for variations in layer thickness, and provide a further signal for closed-loop process control. The triangulation system, using a diode laser (light) and optical filter, reads on being an optical device. Since the device is verifying layer thickness in-situ and has an output signal proportional to the height of the forming structure, the optical device is being used to monitor a physical dimension. At best, it appears that the applicant is arguing that the device in Jeantette indirectly monitors the physical dimension by determining it from other factors, while the applicant directly monitors the physical dimension. However, the applicant's claim language does not support this

argument. Furthermore, Jeantette teaches position-sensing data from a triangulation device for in-situ determination of layer thickness, which reads on directly monitoring the physical dimension.

With respect to claims 2 and 15, the applicant argues that Lewis fails to teach that the material is chosen to promote a phase that is different from that of the substrate. In support, the applicant asserts that the passage the examiner has previously cited for support (column 24, line 29 - column 25, line 68) only deals with joining dissimilar materials and the use of interlayers. The examiner does not agree.

In response, examiner notes that the cited passage is teaching to deposit one metal on top of another metal (substrate), where the metals have significantly different chemical compositions, mechanical properties, and/or physical properties (i.e. phase). An example is given for depositing stainless steel on to aluminum, which have different phases. It is explicitly taught that the interlayer exists as a joint to gradually change the phase between the two dissimilar materials in order to increase adhesion (column 24, line 29 - column 25, line 5). This reads on promoting a phase that is different from that of the substrate.

With respect to claims 3 and 16, the applicant argues that Lewis fails to teach the step of using non-equilibrium synthesis to dissolve a low-solubility material into the layer of material to increase its hardness. In support, the applicant asserts that the passage the examiner has previously cited for support (column 24, line 29 - column 25, line 68)

only deals with joining dissimilar materials and the use of interlayers. The examiner does not agree.

In response, the examiner points out that the last paragraph of the cited section deals with functionally graded materials formed by gradually altering the composition from one location to another, thereby providing different metallurgical and mechanical properties from one location to another in the same article. An example is given for engine turbine discs. It is specifically taught that certain areas of the disc are alloyed in order to increase hardness (column 25, lines 45-60).

With respect to claims 3 and 16, the applicant argues that Lewis fails to teach the step of applying the layer of material using a robotic, closed-loop process. In support, the applicant asserts that the passage the examiner has previously cited for support (column 24, line 29 - column 25, line 68) only deals with joining dissimilar materials and the use of interlayers. The examiner does not agree.

This section was not cited for teaching this limitation. This limitation is taught by the combination of the two references. As discussed in the rejection of the previous action (Paper No. 12), Lewis teaches robotic control (column 15, lines 35-45), but fails to teach optical monitoring for feedback control. Jeantette teaches that optical monitoring for feedback control is used in order to prevent variations in layer thickness (column 8, lines 28-60). It would have been obvious to use optical monitoring for feedback control in the process taught by Lewis. By doing so, one would reap the benefits of preventing variations in layer thickness. By combining the two references, a

robotic (as taught by Lewis), closed-loop (as is taught by Jeantette when referring to "for feedback control") process is realized.

With respect to claim 9, the applicant argues that Lewis fails to teach that the different material is more thermally conductive than the component itself. In support, the applicant asserts that the passage the examiner has previously cited for support (column 24, line 29 - column 25, line 68) only deals with joining dissimilar materials and the use of interlayers. The examiner does not agree.

In response, the examiner points out that the last paragraph of the cited section deals with functionally graded materials formed by gradually altering the composition from one location to another, thereby providing different metallurgical and mechanical properties from one location to another in the same article. An example is given for engine turbine discs. It is specifically taught to produce the part as a graded alloy from the center to rim and the materials within the alloy are selected to coincide with the temperature profile and creep strength requirements of the turbine blade. This includes, or at least makes obvious, the limitation of increasing the thermal conductivity.

With respect to claim 11, the applicant argues that Lewis fails to teach that the different material has a greater density than the component itself. In support, the applicant asserts that the passage the examiner has previously cited for support (column 24, line 29 - column 25, line 68) only deals with joining dissimilar materials and the use of interlayers. The examiner does not agree.

In response, the examiner points out that the last paragraph of the cited section deals with functionally graded materials formed by gradually altering the composition from one location to another, thereby providing different metallurgical and mechanical properties from one location to another in the same article. An example is given for engine turbine discs. It is specifically taught to produce the part as a graded alloy from the center to rim and the materials within the alloy are selected to coincide with the temperature profile and creep strength requirements of the turbine blade. This includes, or at least makes obvious, the limitation of increasing the density.

With respect to claim 12, the applicant argues that Lewis fails to teach that the different material is more corrosion resistant than the component itself. In support, the applicant asserts that the passage the examiner has previously cited for support (column 24, line 29 - column 25, line 68) only deals with joining dissimilar materials and the use of interlayers. The examiner does not agree.

In response, the examiner points out that the last paragraph of the cited section deals with functionally graded materials formed by gradually altering the composition from one location to another, thereby providing different metallurgical and mechanical properties from one location to another in the same article. An example is given for engine turbine discs. It is specifically taught to produce the part as a graded alloy from the center to rim and the materials within the alloy are selected to coincide with the temperature profile and creep strength requirements of the turbine blade. This includes, or at least makes obvious, the limitation of increasing the corrosion resistance.

With respect to claim 13, the applicant argues that Lewis fails to teach that the different material is more resistant to oxidation than the component itself. In support, the applicant asserts that the passage the examiner has previously cited for support (column 24, line 29 - column 25, line 68) only deals with joining dissimilar materials and the use of interlayers. The examiner does not agree.

In response, the examiner points out that the last paragraph of the cited section deals with functionally graded materials formed by gradually altering the composition from one location to another, thereby providing different metallurgical and mechanical properties from one location to another in the same article. An example is given for engine turbine discs. It is specifically taught to produce the part as a graded alloy from the center to rim and the materials within the alloy are selected to coincide with the temperature profile and creep strength requirements of the turbine blade. This includes, or at least makes obvious, the limitation of increasing the oxidation resistance.

As to claim 19, the applicant argues that there is no motivation in Singer to use the process of Lewis, in view of Jeantette, to form the tool of Singer. The examiner acknowledges this argument. However, this argument does not pertain to the rejection of the final rejection. In the previous action (Paper No. 12), the examiner does not suggest forming the tool of Singer by the process of Lewis, in view of Jeantette. On the contrary, the examiner shows how it would have been obvious at the time the invention was made to a person having ordinary skill in the art to include cooling channels in the

tools that are being produced by the process of Lewis, in view of Jeantette. The applicant has argued Singer in view of Lewis, in view of Jeantette, not the rejection of record, which is Lewis, in view of Jeantette, in further view of Singer. The motivation to include a cooling channel in the tool of Lewis, in view of Jeantette, is explicitly taught by Singer. Singer teaches that tools typically comprise cooling channels in order control the temperature of the tool when it is in use (column 2, lines 1-10). To summarize the examiner's rejection, Lewis, in view of Jeantette, teaches forming tools, but is silent to forming cooling channels in the tool. Singer makes up for this deficiency by teaching that cooling channels have the benefit of making it easier to control the temperature of the tool while it is in use. The motivation to combine is the benefit of controlling temperature.

As to claim 20, the applicant argues that Singer fails to teach incorporating a conductive heat sink of thermal barrier in the component. The examiner disagrees. The cooling channels discussed above function as conductive heat sinks (column 2, lines 1-24), as best interpreted from the applicant's specification. The rejection claim 20 is therefore the same as claim 19.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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February 18, 2004

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